

# PHOSPHATE ROCK

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In 2004, U.S. marketable phosphate rock production increased slightly to 35.8 million metric tons (Mt), compared with 35 Mt in 2003 (table 1). Production in the Florida-North Carolina region was up slightly and the Idaho-Utah area increased by 10% from that of 2003 (table 3). U.S. production capacity was 44.2 Mt, which was slightly higher than in 2003 owing to changes in mine production rates by one company (table 12). World production was 141 Mt, 3% higher than in 2003 (table 13). The United States remained the world's leading producer, consumer, and importer of phosphate rock and also the leading producer and supplier of phosphate fertilizers.

Phosphorus is an essential element for plant and animal nutrition and is consumed primarily as a principal component of nitrogen-phosphorus-potassium (NPK) fertilizers. Phosphate rock minerals are the only significant global resources of phosphorus. In this report (unless noted otherwise), mine production is reported in terms of marketable production, which refers to beneficiated phosphate rock with a suitable phosphorus pentoxide ( $P_2O_5$ ) for wet-process phosphoric acid or elemental phosphorus manufacturing. Quantities are reported in metric units and percentages have been calculated using unrounded data.

Phosphate rock was produced at nine mines in Florida, three in Idaho, and one each in North Carolina and Utah (table 2). Domestic phosphate rock statistics are grouped by region to protect company proprietary data. The Florida and North Carolina region accounted for 85% of the total in 2004, and the Idaho and Utah region accounted for the balance. More than 90% of phosphate rock consumed was used to manufacture wet-process phosphoric acid for fertilizer products. The remainder was used to manufacture animal feed supplements, elemental phosphorus, and upgrade into high-purity phosphoric acid for technical and food applications.

According to the U.S. Census Bureau, production of phosphoric acid increased slightly from that of 2003 to 11.5 Mt  $P_2O_5$  content. Combined production of all types of phosphate fertilizers was slightly lower than in 2003. The major fertilizer products manufactured from phosphoric acid were diammonium phosphate (DAP), monoammonium phosphate (MAP), and triple superphosphate (U.S. Census Bureau, 2005).

## Domestic Data Coverage

U.S. Geological Survey (USGS) domestic phosphate rock production data were obtained from monthly and semiannual voluntary canvasses of all companies that owned phosphate rock mines. All companies responded to the canvass in 2004. There were 14 active phosphate rock mines, and 1 mine was idle for the entire year (table 2).

## Production

The leading mines and production facilities in the country are located in Florida and concentrated in the counties of Hardee, Hillsborough, Manatee, and Polk. Eight mines were active in this area in 2004. The Mosaic Company operated seven, and CF Industries, Inc. operated one. Another mine, owned by PCS Phosphate Co., Inc., was located in Hamilton County in northeastern Florida (table 2). In addition, PCS operated a mine and phosphoric acid and fertilizer plants in Beaufort County, NC.

The two leading domestic phosphate companies, Cargill Crop Nutrition (a subsidiary of Cargill, Inc.) and IMC Global, Inc., merged in October to form Mosaic (Mosaic Company, The, 2004). Mosaic became the world's leading producer of phosphoric acid and phosphate fertilizer and the second ranked producer of phosphate rock and feed phosphates. It is second only to Yara International ASA of Norway in terms of total world fertilizer sales. Mosaic accounts for 55% of domestic phosphate rock production capacity and about 57% of U.S. phosphoric acid ( $P_2O_5$  content) production capacity. Worldwide, it has 15% of phosphate rock capacity and 14% of phosphoric acid capacity. Mosaic also produced nitrogen, potash, and associated NPK fertilizers (Green Markets, 2004b).

Mosaic resumed mining at the Wingate Creek Mine in Manatee County late in the year. The mine had been closed since 1999, when the former owner, Mulberry Corp., declared bankruptcy. Cargill Crop Nutrition purchased Wingate Creek in 2003. The Wingate Creek Mine will be used to supplant production lost from the Kingsford Mine, which was scheduled to close in 2005 because of depleted reserves (Pinney, 2005).

The Florida Phosphate Council officially disbanded in early 2005, after its membership was reduced to only Mosaic in late 2004. The Council was organized in 1965 to represent the Florida phosphate industry on State legislative issues. The other member companies withdrew their memberships prior to the merger of IMC and Cargill because of consolidation and changes in the industry. Mosaic opened an office in Tallahassee to perform the function of the Council on its behalf (Lakeland Ledger, 2005<sup>1</sup>).

Phosphate rock mines and processing facilities were adversely affected by three hurricanes that passed through central Florida in August and September. The first, Hurricane Charley, caused power outages in the area, halted production at most mines and plants in the region, and damaged office buildings. The second, Hurricane Frances, affected all mines and plants in the States, causing power outages that resulted in lost production. In addition, the heavy rain and winds from Frances caused a breach in a holding pond on a

<sup>1</sup>References that include a section mark (§) are found in the Internet References Cited section.

phosphogypsum stack at the Cargill Riverview phosphoric acid and fertilizer facility. The last, Hurricane Jeanne, caused significant flooding and power outages. In addition, two fertilizer warehouses sustained roof damage, which damaged some product. The three storms resulted in an estimated loss of nearly 400,000 metric tons (t) of combined phosphate fertilizer production (Green Markets, 2004c).

In the Western Phosphate Field, four mines were active in 2004, three in Idaho, and one in Utah (table 2). In Idaho, phosphate rock was mined in Caribou County by Nu-West Industries, Inc. (a subsidiary of Agrium Inc., Calgary, Alberta, Canada), P4 Production, LLC (a subsidiary of Monsanto Co.), and J.R. Simplot Co. Simplot also operated the Vernal Mine in Uintah County, UT. The Nu-West Dry Valley Mine was idle the entire year; however, it is scheduled to reopen in mid-2005 to replace the company's Rasmussen Ridge Mine, after that mine's ore reserves are depleted (Green Markets, 2004a).

## Consumption

Phosphate rock was used primarily for production of wet-process phosphoric acid for fertilizer applications, which accounted for more than 90% of domestic consumption. The remainder was used in the manufacturing of animal feed supplements, for direct application to soil, elemental phosphorus production, and upgrading into high-purity acid. Domestic consumption of phosphate rock increased slightly to 39 Mt from 38.8 Mt in 2003 (table 1). Phosphate rock sold and/or used as reported by the mining companies rose slightly from 36.4 Mt in 2003 to 36.5 Mt in 2004 (table 4). Consumption by grade was withheld to avoid disclosing company proprietary data.

All phosphate rock mining companies are vertically integrated with one or more fertilizer plants. Mosaic sold a small amount of phosphate rock to U.S. Agri-Chemicals (USAC) (a subsidiary of Sinochem of China) to produce phosphoric acid and fertilizers at its plant in Florida. On October 1, IMC Global terminated its 20-year supply contract with USAC, which was signed in 1994. Under the terms of the contract, termination by IMC (now part of Mosaic) required a 3-year notice, ending the supply agreement on October 1, 2007. Mosaic must reimburse USAC the \$57 million payment, with interest, that was paid in 1994 as the penalty for terminating the agreement (IMC Global Inc., 2004).

Three companies—Agrifos Fertilizer LLC, Pasadena, TX; Mississippi Phosphates Corp. Pascagoula, MS; and PCS Nitrogen, Inc., Geismar, LA—manufactured wet-process phosphoric acid using imported phosphate rock from Morocco. Agrifos and Mississippi Phosphates produced phosphate fertilizer products for domestic and export markets. PCS sold its phosphoric acid to Innophos, Inc., which has a nearby facility, for upgrading into high-purity acid for technical- and food-grade applications (Potash Corporation of Saskatchewan, 2005, p. I-6).

Monsanto Co. operated the only elemental phosphorus plant in the United States in Soda Springs, ID. The company used elemental phosphorus primarily to manufacture phosphorus trichloride, which was used as a chemical intermediary for the production of glyphosate-base herbicides (Mannsville Chemical Products Corp., 2001). Worldwide, elemental phosphorus production has been replaced gradually by purified wet-process phosphoric acid to reduce operating costs and hazardous waste disposal issues. The only other operating elemental phosphorus facilities in the world are located in China, Kazakhstan, and the Netherlands (Duley, undated, p. 7).

The United States is considered a mature market for phosphate fertilizers, with an average consumption of slightly more than 4 million metric tons per year (Mt/yr) during the past decade. Data for 2004 showed a 12% rise in consumption of  $P_2O_5$  contained in fertilizers and a 9.7% increase for all types of fertilizers combined (Terry and Kirby, 2005, p. 6).

## Stocks

Stocks of phosphate rock that were held by producers on December 31 fell by 4% compared with that of 2003. Data for the two regions were consolidated to protect company proprietary information (table 3).

## Transportation

In Florida and North Carolina, crude phosphate rock ore was sent by a slurry pipeline from the mines to the processing plant. Most beneficiated phosphate rock was used internally to manufacture wet-process phosphoric acid; the beneficiated phosphate rock was sent by conveyers to acid plant. The small amount of phosphate rock that was sold to other companies in the region was delivered by rail. Mosaic sent beneficiated phosphate rock by rail to the Port of Tampa and then by barge across the Gulf of Mexico to its facilities in Louisiana. In central Florida, animal feed products, fertilizers, and phosphoric acid, were sent by rail to domestic customers or to the Port of Tampa for export. The Port of Tampa handles the largest volume of fertilizer materials in the world (Tampa Port Authority, 2005).

In northern Florida, PCS Phosphate transported its fertilizer products by rail to consumers; some materials, however, were sent by rail to the PCS port facility at Morehead City, NC, for export. PCS used barges and tugboats to move products from its Aurora, NC, complex to the Port of Morehead City for export or delivery by rail to domestic consumers. Phosphoric acid producers along the Gulf of Mexico received phosphate rock by ship from Morocco and transported their products by barge on the Mississippi River and its tributaries or by rail for domestic consumers. In Idaho and Utah, phosphate rock was sent from the mine to the processing facility via truck, rail, and slurry pipelines.

## Prices

The average sold or used price increased to \$27.76 per metric ton from \$26.95 per ton in 2003 (table 5). Price data were collected through the semiannual canvass of producers and reflected the value of phosphate rock sold or used for phosphoric acid and elemental phosphorus production. A small amount was sold on a long-term contract and included in the average price. Unlike many other mineral commodities, no standard domestic or world price for phosphate rock exists. Average ranges of world prices were published in various industry trade journals based on a sample of transactions. The import price per ton was based on the U.S. Census Bureau customs value and included cost, insurance, and freight (table 1).

## Foreign Trade

U.S. producers reported no exports of phosphate rock in 2004 (table 1). The phosphate rock export table has been eliminated because domestic producers have ceased exporting rock. Previous Minerals Yearbook chapters have used U.S. Census Bureau export statistics to avoid disclosing proprietary data; the U.S. Census Bureau, however, includes reexports by traders, which inflate the reported figure.

The United States is the leading importer of phosphate rock in the world. More than 99% of the shipments are from Morocco for use by the three phosphoric acid producers located along the Gulf of Mexico. A small amount was received from other countries for unspecified uses. In 2004, imports were estimated to be 2.5 Mt, based on U.S. Census Bureau data and export information received from Office Chérifien des Phosphates (OCP Group), the Moroccan phosphate producer. The U.S. Census Bureau withholds tonnage and value information for some phosphate rock and fertilizer product shipments, which necessitates the use of other sources. U.S. import tonnage of other phosphate products was insignificant when compared with exports of the same materials (table 11).

The United States is the leading exporter of phosphate fertilizers in the world, accounting for about 45% of world  $P_2O_5$  exports (Prud'homme, 2004). Total exports of phosphate fertilizers, in terms of tonnage ( $P_2O_5$  content), fell by 7%, which was the fifth consecutive year of lower total exports (tables 6-9). Only MAP exports showed an increase in tonnage, on the strength of sales to South America, primarily to Brazil. U.S. exports of DAP fell by 18% from 2003, with exports of DAP to China dropping by 44% owing to an increase in Chinese domestic production. Based on combined tonnage of all products, Brazil surpassed China as the top destination for U.S. exports of phosphate fertilizers; MAP exports were the major portion of the total. Elemental phosphorus exports were 13,400 t, up from 8,740 t in 2003 (table 10).

## World Review

World production of marketable phosphate rock was 141 Mt (table 13), a 3% increase compared with that of 2003. The United States, China, and Morocco were the leading producing countries in order of output, accounting for 62% of production. World trade in phosphate rock increased by about 4% from that of 2003, owing to higher exports from Egypt, Jordan, and Morocco. The major importing countries and regions were Central Europe, Eastern Europe, India, and the United States (Heffer and Prud'homme, 2004).

World production of phosphoric acid rose by 6% to 32.8 Mt of  $P_2O_5$  because of substantial increases in China, India, and Morocco. World consumption of phosphate contained in fertilizers was estimated to have increased by 2.5% in 2004 to 35.5 Mt  $P_2O_5$  (Prud'homme, 2004).

**China.**—The Government of China imposed limits on exports of phosphate rock to maintain an adequate supply of phosphate rock for domestic fertilizer production. Combined DAP and MAP production grew by 25% in 2004 as Chinese manufacturers reduced their output of low-analysis fertilizers in favor of ammonium phosphates and NPK fertilizers. China's DAP exports grew also, with companies in the southern provinces selling DAP to the Philippines, Thailand, and Vietnam. Imports of DAP fell for the fifth consecutive year (Zhao, 2004).

**Saudi Arabia.**—The Saudi Arabian Mining Company (Ma'aden) awarded a \$5.7 million contract to design the Al-Jalamid phosphate complex, which will be located at Ras Az Zawr on the Arabian Gulf. According to the company, the deposit has a measured ore reserve of 500 Mt and indicated resources that could extend the life of the project beyond the planned 20 years. Ma'aden proposes to produce about 4.5 Mt/yr of phosphate rock to supply its fertilizer plant, which will have production capacity of 2.9 Mt/yr of DAP. The facility was expected to be completed in early 2008 (Neser, 2004).

## Outlook

The short-term outlook for domestic phosphate rock production and consumption shows a slight increase based on projections of domestic and world demand for phosphate fertilizers. The world market for phosphate fertilizer continued its gradual recovery from the cyclical downturn that began in 1999. Excess capacity has been reduced by industry consolidation and increased consumption. The International Fertilizer Industry Association has projected that world phosphate fertilizer consumption will increase by 2.8% in 2005, with the strongest growth in Asia and South America. Much of the growth in Asia is expected in China, which has been gradually increasing its production capacity of DAP and MAP while reducing its output of lower analysis fertilizers. This has resulted in a 40% decrease in DAP imports since 2002, and with another 3 Mt of new capacity expected to be phased in during the next 5 years, imports will likely decline despite increasing annual consumption.

U.S. companies have compensated for lower DAP exports to Asia by increasing sales of MAP to South America, primarily Brazil. Sales are expected to remain steady, but may be slightly lower in late 2005, when a MAP plant expansion is expected to be completed

in Brazil. U.S. sales of DAP to India grew in the second half of 2004 and could continue modest growth in 2005 because of growth in demand and no planned increased capacity in the region.

U.S. phosphate rock annual production capacity is expected to fall during the next year when one mine in Florida and one mine in Idaho are anticipated to close because of depleted reserves. Production rates will not be affected though, owing to the reopening of a mine in Idaho and expansion at others in Florida. Complicated permitting procedures and public opposition to new mines have slowed the development of new mines in Florida. More than one-half of the current production capacity was expected to be exhausted by 2015, which would necessitate new mines or imports to maintain current production rates and leading world supplier status.

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TABLE 1  
SALIENT PHOSPHATE ROCK STATISTICS<sup>1</sup>

(Thousand metric tons and thousand dollars unless otherwise specified)

	2000	2001	2002	2003	2004
<b>United States:</b>					
Mine production (crude ore)	163,000	130,000	154,000	153,000	146,000
<b>Marketable production:</b>					
Gross weight	38,600	31,900	36,100	35,000	35,800
P <sub>2</sub> O <sub>5</sub> content	11,200	9,230	10,700	10,300	10,400
Value	932,000	856,000	993,000	946,000	995,000
Value, average <sup>2</sup> dollars per metric ton	24.14	26.82	27.47	27.01	27.79
<b>Sold or used by producers:<sup>3</sup></b>					
Gross weight	37,400	32,800	34,700	36,400	36,500
P <sub>2</sub> O <sub>5</sub> content	10,900	9,500	10,300	10,600	10,500
Value <sup>4</sup>	909,000	879,000	962,000	981,000	1,010,000
Value, average dollars per metric ton	24.29	26.81	27.69	26.95	27.76
<b>Exports:</b>					
Gross weight <sup>5</sup>	299	9	62	64	-- <sup>6</sup>
Value <sup>6</sup>	12,100	W	W	W	-- <sup>6</sup>
Value, average dollars per metric ton	40.38	W	W	W	XX
<b>Imports for consumption<sup>e, 5, 7</sup></b>					
Quantity	1,930	2,500	2,700	2,400	2,500
Value, cost, insurance, and freight <sup>c</sup>	99,800	123,000	112,000	84,000	91,300
Value, average dollars per metric ton	51.75	49.30	41.45	35.55	36.50
Consumption <sup>e, 8</sup>	39,000	35,300	37,400	38,800	39,000
Stocks, December 31, producers	8,170	7,510	8,860	7,540	7,220
World, production, gross weight	132,000	126,000	135,000	137,000	141,000 <sup>e</sup>

<sup>e</sup>Estimated. W Withheld to avoid disclosing company proprietary data. XX Not applicable. -- Zero.

<sup>1</sup>Data are rounded to no more than three significant digits, except average values per metric ton.

<sup>2</sup>Average value based on the sold or used values.

<sup>3</sup>Includes domestic sales and exports.

<sup>4</sup>Total value of all domestic and export sales.

<sup>5</sup>Source: U.S. Census Bureau.

<sup>6</sup>Reported by producers.

<sup>7</sup>Includes some estimated phosphate rock tonnage imported from Morocco but not reported by the U.S. Census Bureau.

<sup>8</sup>Expressed as sold or used plus imports minus exports.

TABLE 2  
ACTIVE PHOSPHATE ROCK MINES IN THE UNITED STATES IN 2004

Owner	Mine	County and State
CF Industries, Inc.	South Pasture	Hardee, FL.
J.R. Simplot Co.	Smoky Canyon	Caribou, ID.
Do.	Vernal	Uintah, UT.
Mosaic Co., The	Fort Green	Polk, FL.
Do.	Four Corners	Hillsborough/Manatee/Polk, FL.
Do.	Hookers Prairie	Polk, FL.
Do.	Hopewell	Hillsborough, FL.
Do.	Kingsford	Polk/Hillsborough, FL.
Do.	South Fort Meade	Polk, FL.
Do.	Wingate Creek	Manatee, FL.
Nu-West Industries, Inc. (Agrium US, Inc.)	Rasmussen Ridge	Caribou, ID.
P4 Production, LLC. (Monsanto Co.)	Enoch Valley	Do.
PCS Phosphate Co., Inc.	Aurora	Beaufort, NC.
Do.	Swift Creek	Hamilton, FL.

TABLE 3  
PRODUCTION OF PHOSPHATE ROCK IN THE UNITED STATES, BY REGION<sup>1</sup>

(Thousand metric tons and thousand dollars)

Period/region	Mine production, crude ore		Marketable production, beneficiated			
	Rock	P <sub>2</sub> O <sub>5</sub> content	Rock	P <sub>2</sub> O <sub>5</sub> content	Value <sup>2</sup>	Ending stocks, rock
2003:						
Florida and North Carolina	146,000	13,500	30,100	8,910	834,000	5,340
Idaho and Utah	6,870	1,500	4,890	1,350	112,000	2,200
Total	153,000	15,000	35,000	10,300	946,000	7,540
2004:						
January-June:						
Florida and North Carolina	72,200	6,760	16,000	4,710	444,000	5,770
Idaho and Utah	3,250	710	2,400	630	61,400	2,130
Total	75,400	7,470	18,400	5,340	505,000	7,890
July-December:						
Florida and North Carolina	66,100	6,140	14,400	4,220	415,000	W
Idaho and Utah	4,060	938	2,990	818	74,800	W
Total	70,100	7,080	17,400	5,040	490,000	7,220
Grand total	146,000	14,500	35,800	10,400	995,000	XX

XX Not applicable. W Withheld to avoid disclosing company proprietary data.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Based on the per ton sold or used values.

TABLE 4  
PHOSPHATE ROCK SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY REGION<sup>1</sup>

(Thousand metric tons and thousand dollars)

Period/region	Rock	P <sub>2</sub> O <sub>5</sub> content	Value <sup>2</sup>
2003:			
Florida and North Carolina	31,300	9,190	865,000
Idaho and Utah	5,110	1,400	116,000
Total	36,400	10,600	981,000
2004:			
January-June:			
Florida and North Carolina	16,200	4,730	447,000
Idaho and Utah	2,350	609	58,200
Total	18,500	5,340	506,000
July-December:			
Florida and North Carolina	15,400	4,480	442,000
Idaho and Utah	2,580	673	64,600
Total	18,000	5,160	507,000
Grand total	36,500	10,500	1,010,000

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Free on board mine.



TABLE 5  
VALUE OF U.S. PHOSPHATE ROCK, BY GRADE

(Dollars per metric ton, free on board mine)

Grade [percentage of bone phosphate of line (BPL) content <sup>1</sup> ]	2003			2004		
	Domestic	Export	Average	Domestic	Export	Average
66 to less than 70	28.57	NA	28.57	W	NA	W
60 to less than 66	26.75	NA	26.75	27.82	NA	27.82
Average weighted <sup>2</sup>	26.95	W	26.95	27.76	NA	27.76

NA Not available. W Withheld to avoid disclosing company proprietary data.

<sup>1</sup>1.0% BPL (tricalcium phosphate)=0.458% P<sub>2</sub>O<sub>5</sub>.

<sup>2</sup>Includes less than 60% and greater than 70%, in addition to the grades listed.

TABLE 6  
U.S. EXPORTS OF SUPERPHOSPHATES (CONCENTRATED)

(Thousand metric tons)

Country	2003	2004
Argentina	33	8
Australia	81	75
Bangladesh	49	--
Brazil	213	108
Chile	22	57
Cote d'Ivoire	23	--
Japan	32	25
Other	59	44
Total	512	317

-- Zero.

Source: U.S. Census Bureau.

TABLE 7  
U.S. EXPORTS OF DIAMMONIUM PHOSPHATE<sup>1</sup>

(Thousand metric tons)

Country	2003	2004
Argentina	290	365
Australia	205	227
Brazil	160	189
Canada	185	131
Chile	67	67
China	2,550	1,430
Colombia	126	127
Ecuador	55	76
Guatemala	74	36
India	613	426
Japan	322	296
Kenya	86	87
Mexico	401	400
New Zealand	72	115
Pakistan	276	412
Peru	85	118
Thailand	177	95
Turkey	--	55
Vietnam	98	--
Other	311 <sup>r</sup>	387
Total	6,160	5,040

<sup>r</sup>Revised. -- Zero.

<sup>1</sup>Data are rounded to no more than three significant digits;  
may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 8  
U.S. EXPORTS OF MONOAMMONIUM PHOSPHATE<sup>1</sup>

(Thousand metric tons)

Country	2003	2004
Argentina	180	289
Australia	639	756
Brazil	861	1,020
Canada	630	623
Chile	106	83
Colombia	127	123
Japan	119	125
Mexico	159	161
Other	103	245
Total	2,920	3,420

<sup>1</sup>Data are rounded to no more than three significant digits;  
may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 9  
U.S. EXPORTS OF PHOSPHORIC ACID<sup>1</sup>

(Thousand metric tons)

Country	2003	2004
Brazil	53	--
Canada	42	17
Colombia	1	2
India	1	60
Mexico	8	--
Other	1 <sup>r</sup>	79
Total	106	158

<sup>r</sup>Revised. -- Zero.

<sup>1</sup>Excludes superphosphoric acid tonnage.

Source: U.S. Census Bureau.

TABLE 10  
U.S. EXPORTS OF ELEMENTAL PHOSPHORUS<sup>1</sup>

Country	2003		2004	
	Quantity (metric tons)	Value <sup>2</sup> (thousands)	Quantity (metric tons)	Value <sup>2</sup> (thousands)
Brazil	7,540	\$16,200	10,800	\$16,300
Canada	689	1,490	718	1,880
China	39	73	--	--
Japan	60	117	4	7
Korea, Republic of	112	217	5	10
Malaysia	113	267	--	--
Mexico	120	236	1,520	3,250
Taiwan	12	23	7	14
Other	52	163	334	1,200
Total	8,740	18,800	13,400	22,700

-- Zero.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Free alongside ship values.

Source: U.S. Census Bureau.

TABLE 11  
U.S. IMPORTS FOR CONSUMPTION OF PHOSPHATE ROCK AND PHOSPHATIC MATERIALS<sup>1</sup>

(Thousand metric tons and thousand dollars)

Phosphatic materials	2003		2004	
	Quantity	Value <sup>2</sup>	Quantity	Value <sup>2</sup>
Phosphate rock:				
Unground <sup>3</sup>	828	21,200	969	27,300
Ground <sup>3</sup>	460	23,900	510	26,600
Total <sup>4</sup>	2,400	84,000	2,500	91,300
Dicalcium phosphate	6	7,090	7	7,280
Elemental phosphorus	16	23,600	17	32,600
Normal superphosphate	1	175	( <sup>5</sup> )	83
Triple superphosphate	33	4,960	62	10,400
Diammonium phosphate	142	30,700	31	12,900
Fertilizer containing nitrates and phosphates	26	5,270	1	611
Phosphoric acid	51	20,100	71	22,900

<sup>1</sup>Data are rounded to no more than three significant digits.

<sup>2</sup>Declared cost, insurance, freight values.

<sup>3</sup>Some phosphate rock tonnages and values were suppressed by the U.S. Census Bureau.

<sup>4</sup>Includes an estimate for data suppressed by U.S. Census Bureau based on reported Moroccan exports to the United States.

<sup>5</sup>Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 12  
 PHOSPHATE ROCK ANNUAL WORLD  
 PRODUCTION CAPACITY, DECEMBER 31, 2004<sup>1</sup>

(Thousand metric tons)

Region/country	Capacity
Africa	51,400
Asia	33,600
Europe and Russia	14,200
Latin America and Canada	8,500
Middle East	15,300
Oceania	2,650
United States	44,200
Total	170,000

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

Sources: International Fertilizer Industry Association  
 and U.S. Geological Survey.



TABLE 13  
PHOSPHATE ROCK, BASIC SLAG, AND GUANO: WORLD PRODUCTION, BY COUNTRY<sup>1,2</sup>

(Thousand metric tons)

Commodity and country	Gross weight					P <sub>2</sub> O <sub>5</sub> content				
	2000	2001	2002	2003	2004 <sup>c</sup>	2000	2001	2002	2003	2004 <sup>c</sup>
Phosphate rock:										
Albania <sup>c</sup>	1	1	1	--	--	(3)	(3)	(3)	--	--
Algeria	877	939	740	905	805	265 <sup>e</sup>	280 <sup>e</sup>	230 <sup>e</sup>	280 <sup>e</sup>	240
Australia	977	1,893	2,025	2,285	2,014 <sup>4</sup>	225	438	482	545	490 <sup>4</sup>
Brazil, concentrate	4,725	4,685 <sup>r</sup>	5,084 <sup>r</sup>	5,790 <sup>r</sup>	5,400	1,687	1,708	1,831 <sup>r</sup>	2,084 <sup>r</sup>	1,920
Burkina Faso	NA	1	2	2 <sup>e</sup>	2	NA	(3)	1	1 <sup>e</sup>	1
Canada <sup>c</sup>	300	800	1,000	1,000	1,000	125	300	380	380	380
Chile	19	19	20	21 <sup>r</sup>	22	5	5	5	5	5
China <sup>c</sup>	19,400	21,000	23,000	25,200 <sup>r</sup>	25,500	5,820	6,300	6,900	7,550 <sup>r</sup>	7,650
Christmas Island	590	568	500 <sup>e</sup>	500 <sup>e</sup>	500	197	190	167 <sup>e</sup>	167 <sup>e</sup>	167
Colombia	43	43 <sup>e</sup>	43 <sup>e</sup>	43 <sup>e</sup>	43	8	8	8 <sup>e</sup>	8 <sup>e</sup>	8
Egypt, beneficiated	1,096	972	1,550 <sup>r</sup>	2,183 <sup>r</sup>	2,219 <sup>4</sup>	317	293	434 <sup>e</sup>	630	650
Finland <sup>c</sup>	750	750	760	770	780	277	277	280	282	288
India <sup>c</sup>	1,136 <sup>4</sup>	1,200	1,250	1,175 <sup>r</sup>	1,180	336 <sup>4</sup>	355	370	345	349
Indonesia <sup>c</sup>	1	1	1	1	1	(3)	(3)	(3)	(3)	(3)
Iraq, beneficiated <sup>c</sup>	650	300	300	30	100	200	100	100	10	30
Israel	4,110	3,511	3,476	3,208 <sup>r</sup>	2,947 <sup>4</sup>	1,305	1,115	1,110 <sup>e</sup>	1,020 <sup>e</sup>	900
Jordan	5,526	5,843	7,179	6,763	6,223 <sup>4</sup>	1,824	1,928	2,340	2,230 <sup>r,e</sup>	2,000
Kazakhstan	33	97	137	169 <sup>r</sup>	230 <sup>4</sup>	10	28	40	38 <sup>r</sup>	52
Korea, North <sup>c</sup>	350	350	300	300	300	105	105	95	95	95
Mexico	1,052	787	(3)	(3) <sup>r,e</sup>	--	316	236	(3)	(3) <sup>r,e</sup>	--
Morocco <sup>5</sup>	21,463	21,983	23,041	22,877 <sup>r</sup>	26,700	7,200	7,400	7,700	7,400 <sup>r</sup>	8,500
Nauru	504	266	150 <sup>e</sup>	84 <sup>e</sup>	22	194	100	55 <sup>e</sup>	26 <sup>e</sup>	7
Pakistan <sup>c</sup>	11	11	11	11	11	2	2	2	2	2
Peru	17 <sup>e</sup>	16 <sup>e</sup>	16 <sup>e</sup>	32 <sup>r</sup>	32	6	5	6	12 <sup>r</sup>	12
Philippines <sup>c</sup>	434 <sup>4</sup>	450	400	400	400	143	148	135	135	135
Russia <sup>c</sup>	11,100	10,500	10,700	11,000	11,000	4,100	3,900	4,000	4,000	4,000
Senegal	1,738 <sup>r</sup>	1,708	1,545 <sup>r</sup>	1,472	1,600	626 <sup>r</sup>	615 <sup>r</sup>	556 <sup>r</sup>	530 <sup>r</sup>	576
South Africa	2,796	2,420	2,803	2,643	2,735 <sup>4</sup>	1,083	995	1,086	1,030 <sup>e</sup>	1,067 <sup>4</sup>
Sri Lanka	34	35	39	41 <sup>r</sup>	42	12	12	13	14 <sup>r</sup>	14
Syria	2,166	2,043	2,483	2,414 <sup>r</sup>	2,883 <sup>4</sup>	646 <sup>e</sup>	613 <sup>e</sup>	745 <sup>e</sup>	725 <sup>e</sup>	870
Tanzania	5 <sup>r</sup>	4 <sup>r</sup>	1 <sup>r</sup>	4 <sup>r</sup>	4	2 <sup>r</sup>	1 <sup>r</sup>	(3) <sup>r</sup>	1 <sup>r</sup>	1
Thailand	3	2	4	14 <sup>r</sup>	14	1 <sup>e</sup>	1 <sup>e</sup>	1 <sup>e</sup>	4 <sup>r,e</sup>	4
Togo	1,370 <sup>r</sup>	1,067 <sup>r</sup>	1,271 <sup>r</sup>	1,471 <sup>r</sup>	1,115 <sup>4</sup>	490 <sup>r,e</sup>	380 <sup>e</sup>	460 <sup>e</sup>	530 <sup>e</sup>	400
Tunisia, washed <sup>c</sup>	8,339 <sup>4</sup>	8,144 <sup>4</sup>	7,735 <sup>4</sup>	7,890	8,050	2,500	2,440	2,300	2,300	2,400
United States	38,600	31,900	36,100	35,000	35,800 <sup>4</sup>	11,200	9,230	10,700	10,600	10,400 <sup>4</sup>
Uzbekistan <sup>c</sup>	150	200	425	430	430	36	47	101	102	102
Venezuela	389	399	390 <sup>r</sup>	260 <sup>r</sup>	250	105	114 <sup>e</sup>	111 <sup>e</sup>	75 <sup>r,e</sup>	70
Vietnam <sup>c</sup>	785 <sup>4</sup>	677 <sup>r</sup>	680 <sup>r</sup>	700 <sup>r</sup>	750	236 <sup>4</sup>	225	204 <sup>r</sup>	210 <sup>r</sup>	225
Zimbabwe, concentrate	78	87	108	95 <sup>r</sup>	83 <sup>4</sup>	25	28	39	31 <sup>r</sup>	27 <sup>4</sup>
Total	132,000	126,000	135,000	137,000	141,000	41,600 <sup>r</sup>	39,900	43,000 <sup>r</sup>	43,400	44,000
Basic (Thomas converter) slag: <sup>c</sup>										
Argentina	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	--	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	--
Egypt	7	7	7	7	7	2	2	2	2	2
France	50	50	50	50	50	8	8	8	8	8
Germany	200 <sup>r</sup>	200 <sup>r</sup>	200 <sup>r</sup>	150	150	20 <sup>r</sup>	20 <sup>r</sup>	20 <sup>r</sup>	18	18
Luxembourg	475	475	475	475	450	75	75	75	75	75
Total	732 <sup>r</sup>	732 <sup>r</sup>	732 <sup>r</sup>	682	657	105 <sup>r</sup>	105 <sup>r</sup>	105 <sup>r</sup>	103	103

<sup>c</sup>Estimated. <sup>r</sup>Revised. -- Zero.

<sup>1</sup>World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Table includes data available through May 3, 2005. Data for major phosphate rock-producing countries derived in part from the International Fertilizer Industry Association; other figures are from official country sources where available.

<sup>3</sup>Less than ½ unit.

<sup>4</sup>Reported figure.

<sup>5</sup>Includes production from Western Sahara.